DR. GEO. I. ADAMS, who has been professor of geology and mining at the Pei Yang University at Tientsin, China, has been appointed to the faculty of the Government University at Peking.

MR. C. T. R. WILSON, F.R.S., lecturer in experimental physics at the University of Cambridge, has been elected to a fellowship in Sidney Sussex College for a period of five years.

THE board of Trinity College, Dublin, has appointed Miss E. M. Maxwell, of the Royal Victoria Eye and Ear Hospital, Dublin, to the Montgomery lectureship in ophthalmology.

DISCUSSION AND CORRESPONDENCE

APPLICATION OF PETROGRAPHIC METHODS TO ANALYTICAL CHEMISTRY

WHEN it is considered that minerals are fundamentally more or less definite chemical compounds and that optical mineralogy has attained a high stage of development and importance, it is a matter of considerable surprise that the application of petrographic methods to general chemistry has been attempted in so relatively few instances and that at present, speaking generally, crystal optics is a subject almost unheard of among the great majority of chemists. Chemical literature is filled with such vague crystal descriptions as "needles," "tablets," etc., which it is hardly necessary to say are almost worthless—absolutely so when taken out of connection with the reactions of the compounds. Crystallographic measurements are not always possible, are tedious, and lack general applicability. Microchemical reactions usually resolve themselves into simple observation of the appearances of the crystals formed, a procedure open to the objection that in many cases very diverse substances crystallize rather similarly. Petrographic methods are open to none of these objections. In a very large number of substances the optical data is definitive. The methods are of general applicability to crystalline material regardless of the existence or non-existence of crystal faces, and are rapid and comparatively simple.

It is well known that the rock-forming minerals are now usually determined by microscopic examination and that it is even possible to calculate approximately the chemical composition of a rock from the data thus obtained. In some rather rare instances these same methods have been extended to chemical compounds other than minerals. In 1898 J. L. C. Schroeder van der Kolk[1] published an acount of petrographic methods and applied them to certain artificial salts. Otto Rosenheim[2] by a determination of the optical characters, positive or negative, of phrenosin and kerasin, obtained from the brain, succeeded in differentiating these two substances. This test was confirmed in this laboratory on the same materials obtained from molds. Fry[3] has applied petrographic methods to the determination of the various salts ordinarily occurring in commercial fertilizers, and to the determination of mixed solids obtained in certain phase-rule work,[4] all cases where chemical analysis could not give the desired results. In a very recent address before the Chemical Society of Washington Dr. F. E. Wright called attention to the utility of petrographic methods in chemical analysis, and during this address and the succeeding discussion several specific applications were pointed out, notably that of the differentiation of the sugars. The published reports of Dr. Wright and coworkers afford numerous instances of the valuable application of petrographic methods to many substances, especially in the examination of products obtained in various melts. This work can not be too highly commended. Chamot[5] has emphasized the usefulness of the methods.

Recently the literature has been searched and practically complete optical data has been found for over 375 chemical individuals ranging from simple elements to the more complex inorganic and organic compounds. In addition there is an immense number of compounds of which some of the data is known. This makes it quite possible to definitely identify quite a

[1] "Kurze Anleitung zur Mikroskopischen Krystallbestimmung," Wiesbaden.

[2] *Biochem. Jour.*, 8, 110, 1914.

[3] U. S. Dept. of Agric., Bul. 97, 1914.

[4] Parker, *Jour. Phys. Chem.*, 18, 653–61, 1914.

[5] "Elementary Chemical Microscopy."

number of chemical individuals and to differentiate a vastly larger number. For simple differentiation, however, it should be understood that it is not necessary that any data be known since sufficient may usually be obtained in five minutes or less.

It is obvious that by the use of petrographic methods in chemical work an immense amount of time can be saved, a saving that overwhelmingly counterbalances the initial cost of equipment and the rather unimportant trouble of learning the methods. With numerous substances the necessity for tedious qualitative analysis can be obviated or at least greatly limited. Reagents or precipitates, where extremely accurate results are not sought, may be examined for purity with scarcely more than a glance. This is of great value in various phases of drug examination or general inspection work. In this laboratory the petrographic microscope has supplanted a large amount of routine chemical analysis with a consequent saving of both time and reagents.

This paper is written with the purpose of calling to the attention of chemists the fact that, while the petrographic microscope can never entirely supplant chemical analysis, it may be and actually is an aid which can not fail to be of very great service both to the research and to the commercial worker.

William H. Fry

Bureau of Soils,
U. S. Department of Agriculture,
Washington, D. C.

To the American Physical Society

In his announcement of June 25th to the members of the American Physical Society, Professor Cole expresses the fear that there will not be room on the program of the San Francisco meeting of August 6 for many papers from eastern members. Evidently Professor Cole has overestimated the numbers or the scientific activity of the members of the Physical Society on the Pacific Coast.

It is the belief of the coast committee on program that there will be ample time for the reading of all papers that our eastern members are willing to present, and accordingly this committee especially invites papers from the eastern members at this session.

Fernando Sanford,
E. P. Lewis,
For the Committee

A Correction

May I be allowed to call attention to a printer's error in my article entitled "Some Reasons for Saving the Genus," which was published in Science for June 18, 1915? The concluding sentence (p. 902) was rendered entirely ineffective by the omission of a line. The sentence should read: "In this conflict the 'general biologist' should, I think, lend his support to that faction which shows the higher regard for the interests of the scientific public."

F. B. Sumner

A Chicken with Four Legs

On December 15, 1914, a chicken was hatched out of one of our settings which had four legs. It lived from one evening to the next noon when it was stepped upon by the mother-hen and killed. It seemed to be normal in every other respect, eating and walking about like the others, of the usual markings and full size but not unusually large.

The two extra legs were at either side of the extreme rear of the body, appeared to be complete in all the essentials, having the three main toes and the small toe together with toenails. These extra legs were about two thirds the size of the principal ones, were a lighter yellow in color and had the toes facing the rear, the opposite to the ordinary ones.

In walking, the chicken curled up the extra legs behind it, using only the principal ones.

It was of the Plymouth Rock breed and nothing unusual was noticeable about any of the eggs of the setting. There did not seem to be anything unusual in the fertility of the eggs—hatchings running from two to eleven chickens. Six eggs of the setting in question hatched and all the remainder appear entirely normal.

This specimen was sent to the Museum of the Escuela de Agricultra here.

C. D. Perrine

Córdoba, December 22, 1914